Sustainable IMP Test Bed Facility For H-60 (Navy SeaHawk) Helicopters

0817 Pollution Abatement Ashore Program

23 March 2004

Technical POC
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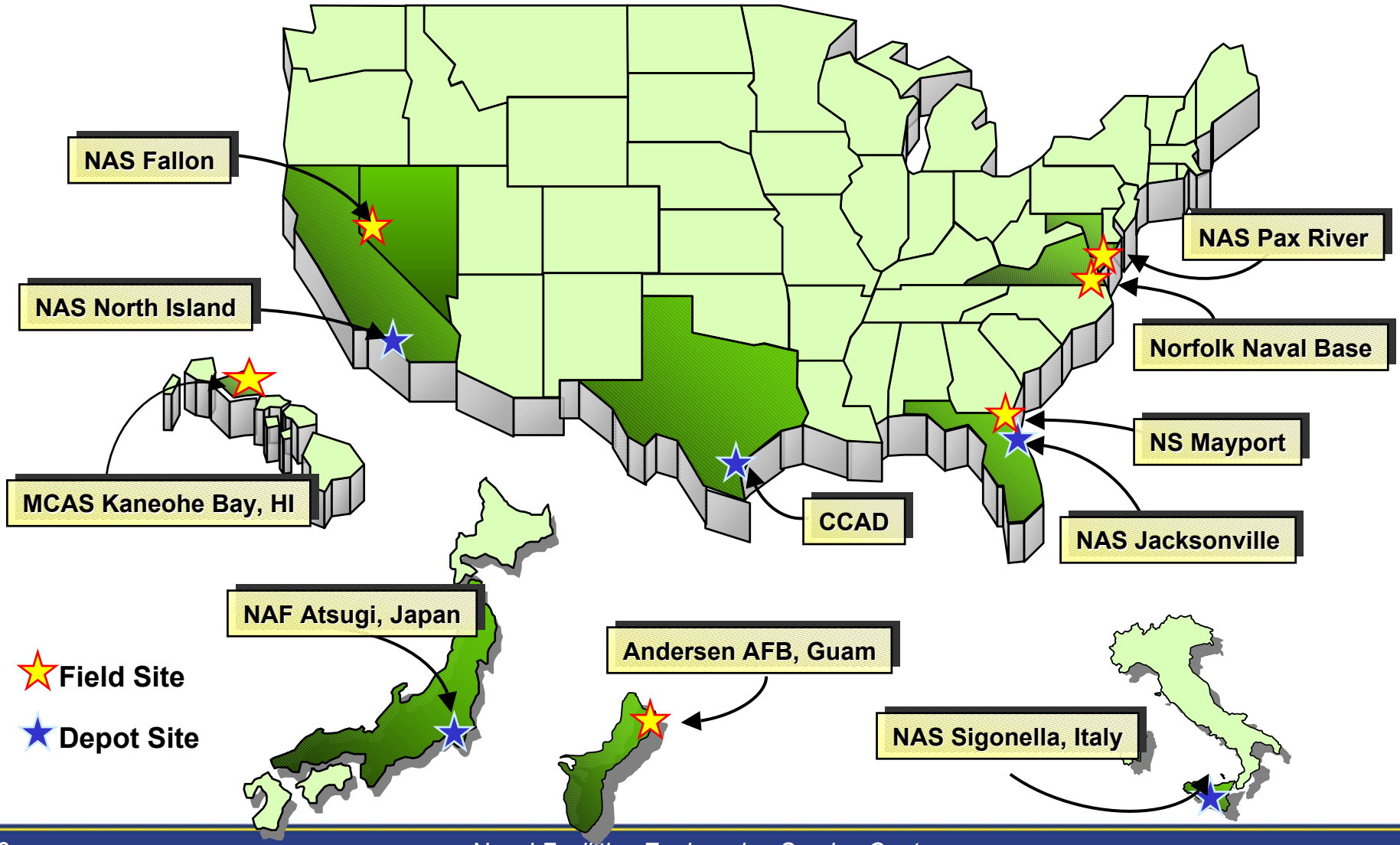
Background- IMP Brings Maintenance Artisans to the Aircraft



Objective

- **Develop and evaluate Sustainable IMP "Green" Test bed Facility:**
  - **Modular, flexible maintenance operations**
  - **Integrate P2 technologies and equipment**
  - **Rigorous control of HazMat**
  - **Use of environmentally preferable products**
  - **Create healthful working environment**

- **Support the Navy's transition from the traditional OI&D maintenance to IMP phased maintenance**

Navy EQ Requirements

Requirements	Priority	Requirement Title
2.I.01.g	High	Control/Reduce emissions from Coating, Stripping, and Cleaning Operations
2.I.01.q	High	Control of VOC and HAP Emissions
3.I.04.e	High	Minimize Paint application wastes
3.II.03.a	High	Non-VOC/ODS Solvents and Cleaning Systems for Aircraft/Weapons and Shipboard/Shore Side Applications

Problem Statement/Drivers

- **Many MH-60 Maintenance Operations use Hazardous Materials for cleaning and corrosion control.**

- **Paint Stripping Operations and Repainting Operations (PMI-4 maintenance requirements) :**
  - **Creates Hazardous Air Pollutants (HAPs)**
  - **Uses Volatile Organic Compounds (VOCs)**
  - **Generates large amounts of paint waste (HAZMAT & HAPs)**

- **IMP Operations must be completely cost neutral**
  - **No MILCON**
  - **No major facility investments**
  - **Must be operational on delivery of aircraft**

Problem Statement/Drivers

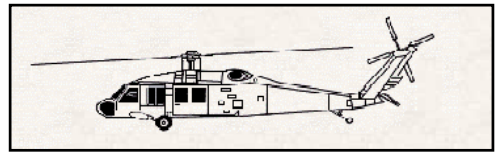
- **ALL OPERATIONS MUST COMPLY WITH FEDERAL, STATE AND LOCAL REGULATIONS**
  - **National Emissions Standards for Hazardous Air Pollutants (NESHAP)**
  - **Requires tracking of 189 HAPs**
  - **National Ambient Air Quality Standards (NAAQS)**
  - **Air Quality Management Districts regulate VOCs**
    - **Require emission control equipment**
    - **Limit VOC content of solvents**
    - **Process ban**

Milestones & Major Deliverables

	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4
MILESTONE	**2001**				**2002**				**2003**				**2004**			
	Q1	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
1. •Initiation Decision																
2. •Technology Assessment																
3. •Conduct Site Assessment																
4. •Test bed Site Selection																
5. •Test Bed Design																
6. •Install Technologies																
7. •Monitor Performance																
8. •Document Results																

PRODUCTS

- **Initiation Decision Report** **'01**
- **Technology Assessment Report** **'02**
- **IMP Test Bed Design Drawings** **'03**
- **Final Report of IMP Test Bed Results** **'04**



Approach

1. **Initiation Decision Report**
   - Evaluate IMP deployment sites and determine if P2 products will work in the operational H-60 environment; and what benefits are to be derived
2. **Site Assessment Technology Assessment-**
   - Evaluate technology/infrastructure shortfalls at IMP deployment sites and determine sustainable P2 products that will work in and operational H-60 environment
   - Partner with NAVAIR WIPT For Environment, PPEP program, Energy Conservation, Water Conservation and other programs to select products to insert into the H-60 program
3. **Conduct H-60 Site Assessment**
   - Evaluate IMP sites to host test bed
4. **Test Bed Site Selection**
   - Evaluate available buildings and secure approval to implement test bed
5. **Test Bed Design**
   - Develop drawings, acquire H-60 approval

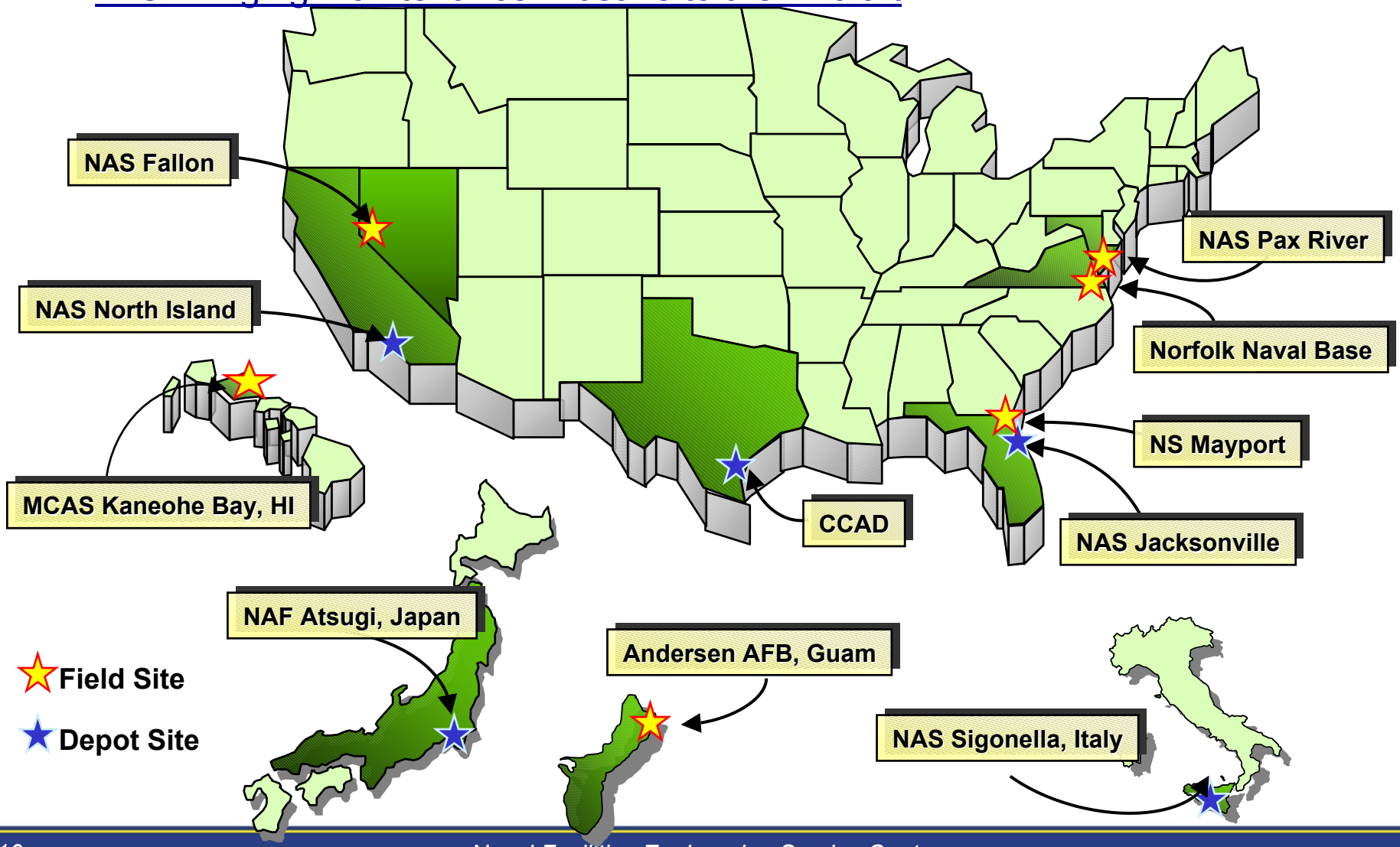
Approach (Continued)

6. **Install Technologies**
   - Purchase and install sustainable processes (i.e., equipment) into a selected building
7. **Monitor Performance**
   - Gather and analyze performance data
   - Define data collection requirements
8. **Document Results**
   - Collect data from operational environment
   - Analyze test bed results
   - Document (via a Technical Data Package) the lesson learned to all IMP sites.
   - Technology transfer-Assist NAVAIR in the standing up secondary H-60 IMP sites
   - Transfer lessons learned to other platforms currently implementing IMP

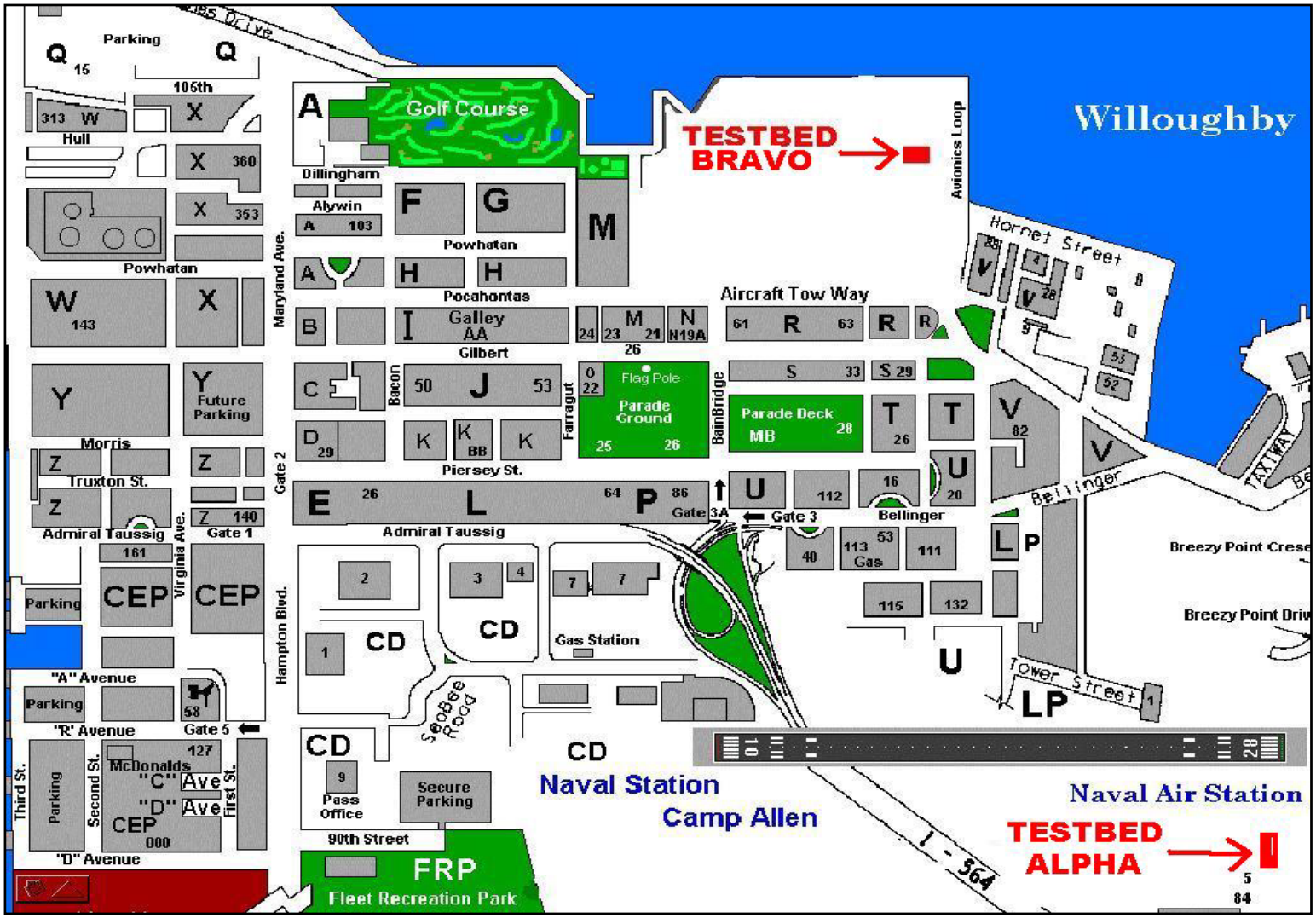
•MAIN GOAL- IMPROVE READINESS,- IMPROVE EFFICIENCY, ESOH COMPLIANCE, & SAVE $'S

MS#3-Conduct H-60 Site Assessment

IMC-Bringing Maintenance Artisans to the Aircraft

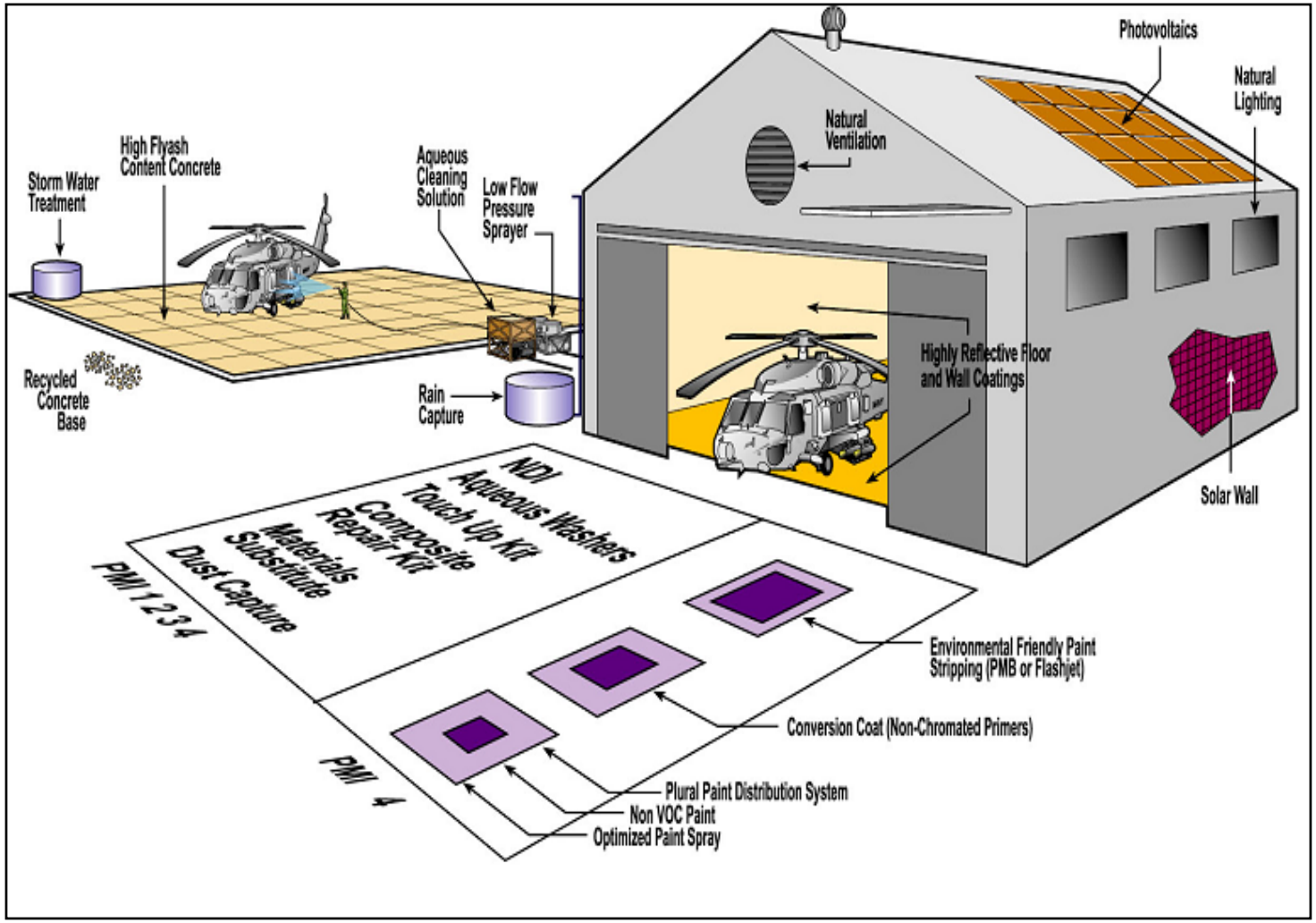


MS#4- Norfolk Test bed Site Selection



MS#5-Development of Test Bed Design

Notional Concept For an IMP Test Bed



MS#6-Potential Technology Sources

Programs

- PPEP
- NELP
- NAVAIR SYSCOM
- JGPP
- W2210 P/ LMTCE Products
- Y0817
- Energy Program
- Water Conservation
- Recycling Program

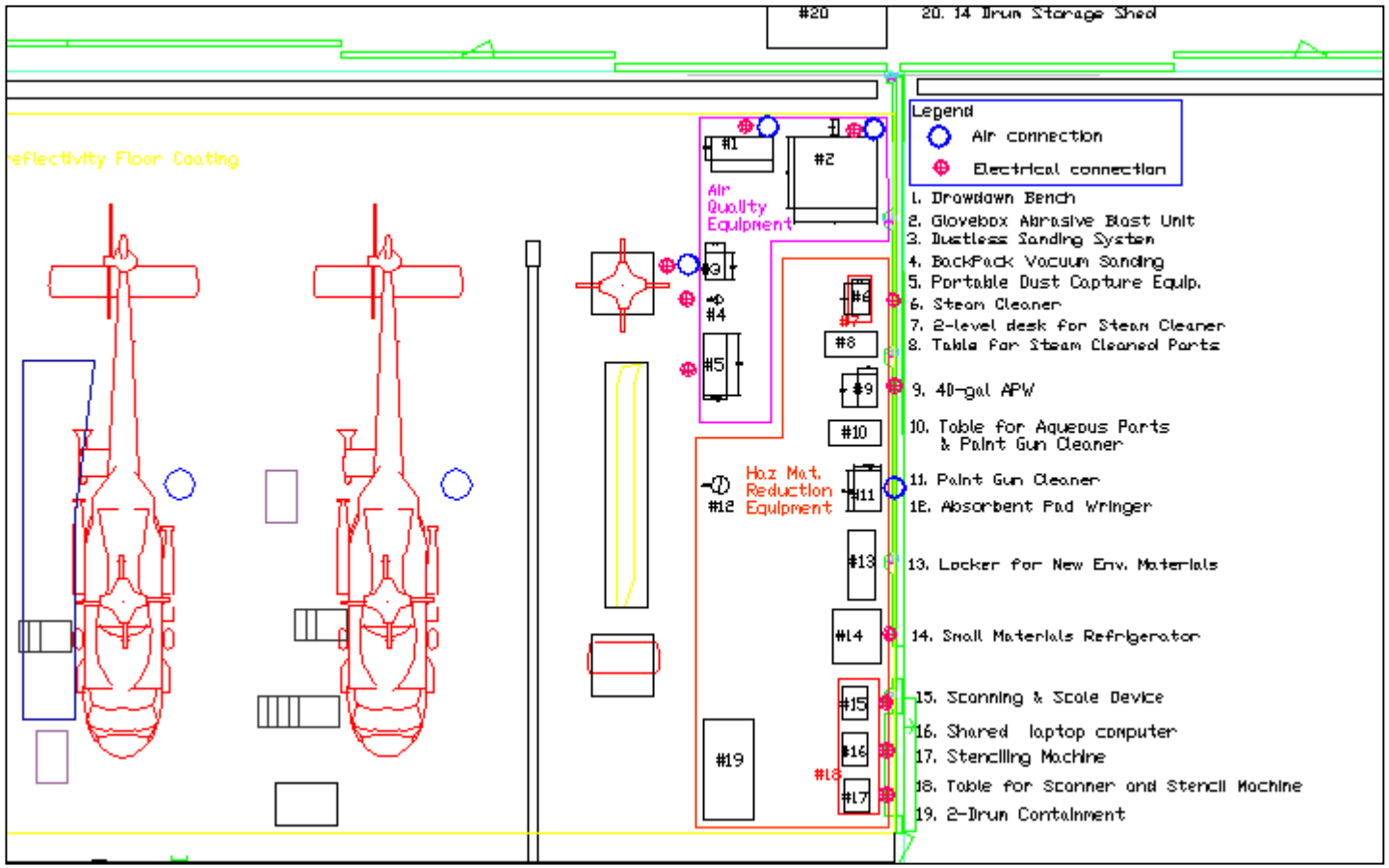
Technologies

- Paint Application
- Paint Removal
- Parts Washing
- Dust Capture
- Non-destructive Inspection
- Composite Repair
- Corrosion Control
- Parts Storage Control
- Conversion Coating
- Metal Bonding
- Sealants
- Dry Steam Cleaning
- Abrasive Processes
- Degreasing
- Stenciling
- Paint Gun Cleaner

MS#6 -Install Technologies

Installing IMP Equipment At LP-167

Rendering 1st Generation



MS#6-Install Technologies

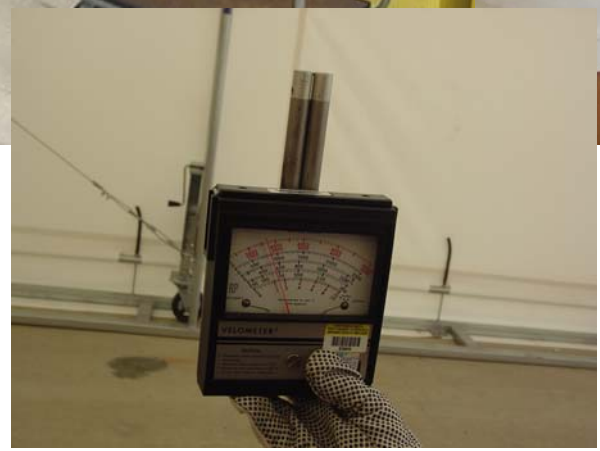
Installing Technologies Into LP-167

Abrasive Blast Glove Box

MS#7-Monitor Performance and Document

Hazmat

Noise



Air Quality

(PMF Air Flow)

MS#7 Results: Before/After Comparison

Before	After
VOC Emissions Control	Install new paint systems to eliminate VOC emissions
NESHAP Emissions Control	Eliminate HAP containing materials that meet mission needs
HAZMAT Management, Toxic Release Inventory (TRI) Reportable Chemicals	Eliminate/Substitute Materials and processes

Before

After

MS#8 Benefits: ROI Calculation based on PMF*

Project Cost (PC) (Corrosion Prevention and Control $ + Other cost):

Assumptions:

i. Cost of PMF: $500K
ii. Number of sites implementing the PMF: 6 sites
iii. Number of aircraft striped per year: 6
iv. Cost of transport to nearest primary site: Per aircraft- three aircraft req'd: $15K** X 3= $45K
(**transport cost can vary from $15K to $500K per aircraft depending on site location)
v. Life of the PMF- 10 years
vi. Elimination of Methylene Chloride use- $5K per site X 6= $80K
vii. Total savings= $270 + $80K= $350K

Useful Life Savings (ULS):
Based on the above assumptions $350K x 10 = $3.5M will be spent transporting the aircraft to a primary site for stripping and painting.

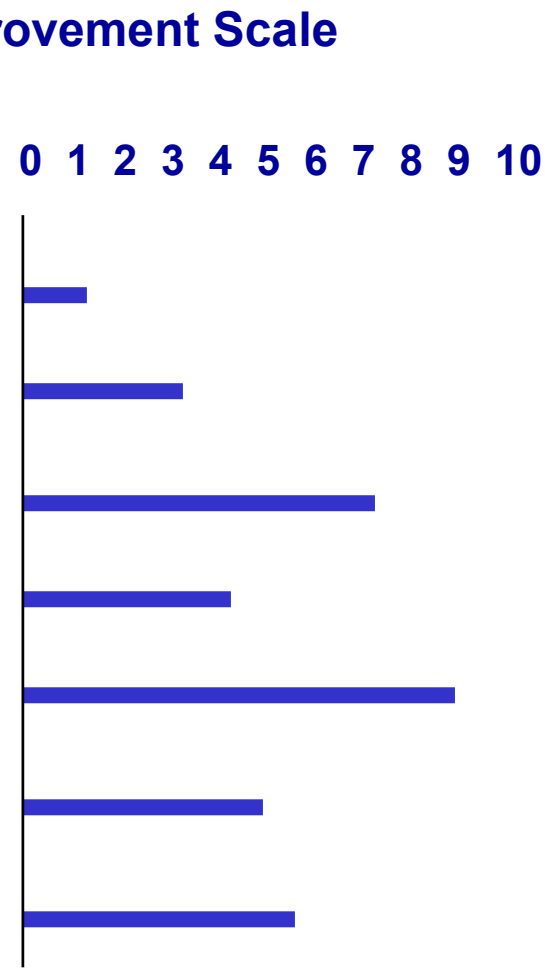
ROI – Computation

$$ROI = \frac{ULS}{PC} = \frac{3.5M}{500K} = 7.5$$

*** Assumption: Implementing 6 PMF at 6 different deployment sites.**

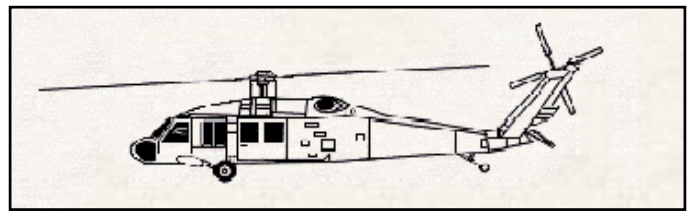
Benefit : Sustainability

Technology/Equipment	Improvement Measure
Low Voc Paints	Material Cost
	Labor Cost
	Sustainment
	Readiness/Availability
	HAZMAT Reduction
	QOL Improvement
	Safety



Milestones

	Planned	Actual	Planned
1. Initiation Decision Report	9/01	11/01	
2. Technology Assessment	1/02	ongoing	
3. Conduct Site Assessment	3/02	03/02	
4. Test bed Site Selection	5/02	05/02	
5. Test Bed Design	8/02	12/02	
6. Install Technologies (PMF)	9/03	4/04	
7. Monitor Performance	3/04		6/04
8. Document Results	5/04		8/04



Summary of Accomplishments to Date MS#6 & #7

SUMMARY

- Installed 25 Pieces Of PPEP Equipment Into NAS Norfolk Test Bed.
- Purchased $1M In IMP Support Equipment For NAVAIR IMP Sites
- Developed PMF Concept
- Tested Prototype PMF
- Designed PMF For Guam, KBAY & Norfolk
- Continued Monitoring And Tracking At Norfolk

Accomplishments to Date MS#6 (Cont)

PMF
Cost Is
1/3 to 1/2
That of
A Conventional
Design.

Approximate cost
$500K

Sized for H-60
at H=21’,L=60’, W=24’

Accomplishments to Date MS#6 & #7 (Cont)

- **Installation and Monitoring Of Sustainable Equipment At Norfolk**
  - Development of Optimized P2 Equipment Layout Drawings
  - Performed Metrics Study
  - Installation of Reflective Floor Coating
  - Installation of 25 Pieces of P2 Equipment
  - Installation of Performance Monitoring Equipment
  - Installation of Hazmat/hazwaste Management System
  - Performed Field Tests and Surveys

- **PMF Development**
  - Developed PMF Paint and Depaint Specification and Drawing Package For H-60 and H-53 Helo
  - Designed and Constructed Prototype
  - Performed PMF OSH Analysis
  - Performed Ventilation Tests
  - Performed Light and Sound Tests
  - Performed Fabric Damage Test

Accomplishments to Date MS#7 (Continued)

Test And Monitored PMF

- Portability
- PMB Containment
- Logistic Requirement
  - Start-up Requirements
  - Installation Requirement
  - Support Equipment Requirements
  - Stowage
  - Equipment Interface

ESC Recognized As Technical Expert In Facilities And P2 Equipment Required For Standing Up PMI 4

- PMA
- Depots
- Platform Sponsor
- AIRPAC & AIRLANT
- NAVAIR HQ
- Imp Site Coordinators
- Maintenance Officers

Accomplishments to Date MS#7 & #8 (Continued)

- **Test And Monitor –Evaluation At Norfolk**
  - System Effective
  - Lighting Improvement
  - Energy Use
  - Water Usage
  - Morale Improvement
  - Safety
  - Efficiency
  - Man-hour Reduction
  - Dollar Saved
  - HAZMAT/HAZWASTE Tracking
- **Document Lessons Learned**
  - Research with Paint Expert On New Zero VOC Paint
  - Managing PMB
  - Economic

Accomplishments to Date MS#8 (Ongoing)

- **Final Tech Data Package**
  - **Compendium Of Sustainable P2 Equipment**
  - **Include Env. Preferable Materials**
  - **IMP Process Flow Diagrams**
  - **Facilities Specification Requirements**
  - **PPEP Equipment Flow Chart**
  - **Test Bed Monitoring**
  - **OSH Analysis and Certification**
  - **Economic Analysis**
  - **PMF Drawings and Specifications**
  - **Lessons Learned-environmental Permitting**
  - **Photo Documentation**
  - **Logistics Analysis**

Final Efforts

- PMF Ventilation Certification
- Portability
- Leakage
- Durability Of Fabric Material
- Evaluate Air wall Dual Usage
- OSH Study And Approvals
- Finalize Logistics For PMF Deployment
- Test Maintenance Stand At Norfolk
- Finalize Prototype Scanner (HAZMAT/HAZWASTE Management System) At Norfolk
- Deploy PMF
- Final Documentation

Summary of Implementation Accomplishments

- Coordinated With NAVAIR, WIPT, JG-PP, Regional Engineers, and EPA
- Distributed White Papers, economic Analysis, Resolution Papers, and Supported Permit Applications.
- PMF Being Reviewed by NAVFAC Fire Marshall.
- H-60 Class desk Requested ESC To Brief Test Bed and PMF Development at NAPRA-Atsugi, PAX River, and North Island.
- PMF Prototype Available For Demonstration.

- Support IMP Transition And Potential Use Of PMF At:
  - –Guam
  - –Norfolk
  - –Kaneohe Bay
  - –Okinawa
  - –Yuma
  - –Camp Pendleton
  - –Army- Puerto Rico
- Main T2 Tool- Via Procurement Spec & Consultation

Accomplishments to Date (Implementation)

- **Leveraged Funds**
  - Secured $30K for Norfolk Test bed site assessment from NAVAIR 3.0.
  - Secured over $250K value of equipment from PPEP to support test bed.
  - Secured $800K to procure sustainable equipment for Norfolk Test bed, KBAY and Guam PMF.
- **NORFOLK SITE APPROVAL & COORDINATION**
  - Airfield Manager
  - AIMD
  - Squadrons
  - DEPOT Jacksonville/IMP Site Coordinator
  - PMA 299
  - Air LANT
  - NAVAIR HQ
  - LANTDIV
  - PW, ROIC, Regional Eng, Regional Environmental
  - Wing Maintenance Leadership

Accomplishments to Date (Implementation)

- **IMP CONSULTATION**
  - DEVELOPED PMI 4 PROCESS FLOW DIAGRAM
  - REQUESTED TO ATTEND IMP START-UP MEETINGS
  - REQUESTED TO BRIEF TEST BED AND PMF @:
    - GUAM
    - ATSUGI
    - PAXTUXENT RIVER
    - NORTH ISLAND
    - CAMP PENDLETON
    - KBAY
  - REQUESTED TO PROCURE SUSTAINABLE BLAST AND PAINT BOOTHS.
  - REQUESTED TO REVIEW OKINAWA BLAST/PAINT BOOTH SPECIFICATION FOR H-1.

- **PLATFORMS REQUESTING INFO ON PMF**
  - H-1
  - AV-8B
  - H-53
  - HUEY
  - ARMY ROTARY WING
  - PRIVATE INDUSTRY
  - BLASTOFF INC

Logic Model for Sustainable IMP Test Bed Facility in support of H-60 SeaHawk Helicopters

Navy Benefits	Ability to carry out IMP maintenance at Secondary sites with improved efficiency, EOSH compliance and reduced costs
Customer Capability	In addition to being able to comply with local EOSH regulations, the site can conduct paint/depaint operations in PMI-4
Products	(1) A TDP which will list the lessons learned in the establishment of the IMP Test Bed. (2) Documented performance of P2 and other equipment used in H-60 maintence. (3) A prototype PMF (3-in-1) for use at IMP Secondary sites.
Project Milestones	FY04- Finalize equipment Installation and testing. Continue evaluating and monitoring of IMP test bed at NAS Norfolk. Complete evaluation of a PMF prototype. Deployment of the PMF.

Funding

$M	FY00	FY01	FY02	FY03	FY04
Current	0.00	0.16	0.26	0.58	0.06
Baseline	0.00	0.16	0.26	0.58	0.06

Questions & Discussion?

THANK YOU!

Background-- Key Acronyms

- IMP- Integrated Maintenance Plan
- ASPA- Aircraft Service Point Adjustment
- SDLM-Standard Depot Level Maintenance
- RCM- Reliability Centered Maintenance
- PMF- Portable Maintenance Facility
- PMI- Planned Maintenance Interval
- O, I & D- Organizational, Intermediate and Depot Level Maintenance,
- H-60- The Navy's Seahawk Helicopter– The Multi-use MH-60

Approach- Technology Assessment

Planned Maintenance Intervals (PMI)

PMI 1 (yr 2)	•Fittings •Upper Cabin Str •Flight Controls •CPC Fogging			
PMI 2 (yr 4)	•Fittings •Upper Cabin Str •Flight Controls •CPC Fogging	•Fittings •Extended Pylon Str •Cabin Zonal •Transition Zonal •Paint Assessment	•Fittings •Lower Cabin Str •Fuel Cell Zonal •Floor Boards •Mission Systems	
PMI 3 (yr 6)	•Fittings •Upper Cabin Str •Flight Controls •CPC Fogging			
PMI 4 (yr 8)	•Fittings •Upper Cabin Str •Flight Controls •CPC Fogging		•Fittings •Lower Cabin Str •Fuel Cell Zonal •Floor Boards •Mission Systems	•Fittings •Nose Zonal •Tail Cone Zonal •Tail Pylon Zonal •MRP Zonal •Strip and Paint

Approach- Technology Assessment

•MAIN GOAL- IMPROVE READINESS,- IMPROVE EFFICIENCY, ESOH COMPLIANCE, & SAVE $'S

A
TYPICAL
H-60
MAINTENANCE
AREA

Potential Technology Types (Cont.)

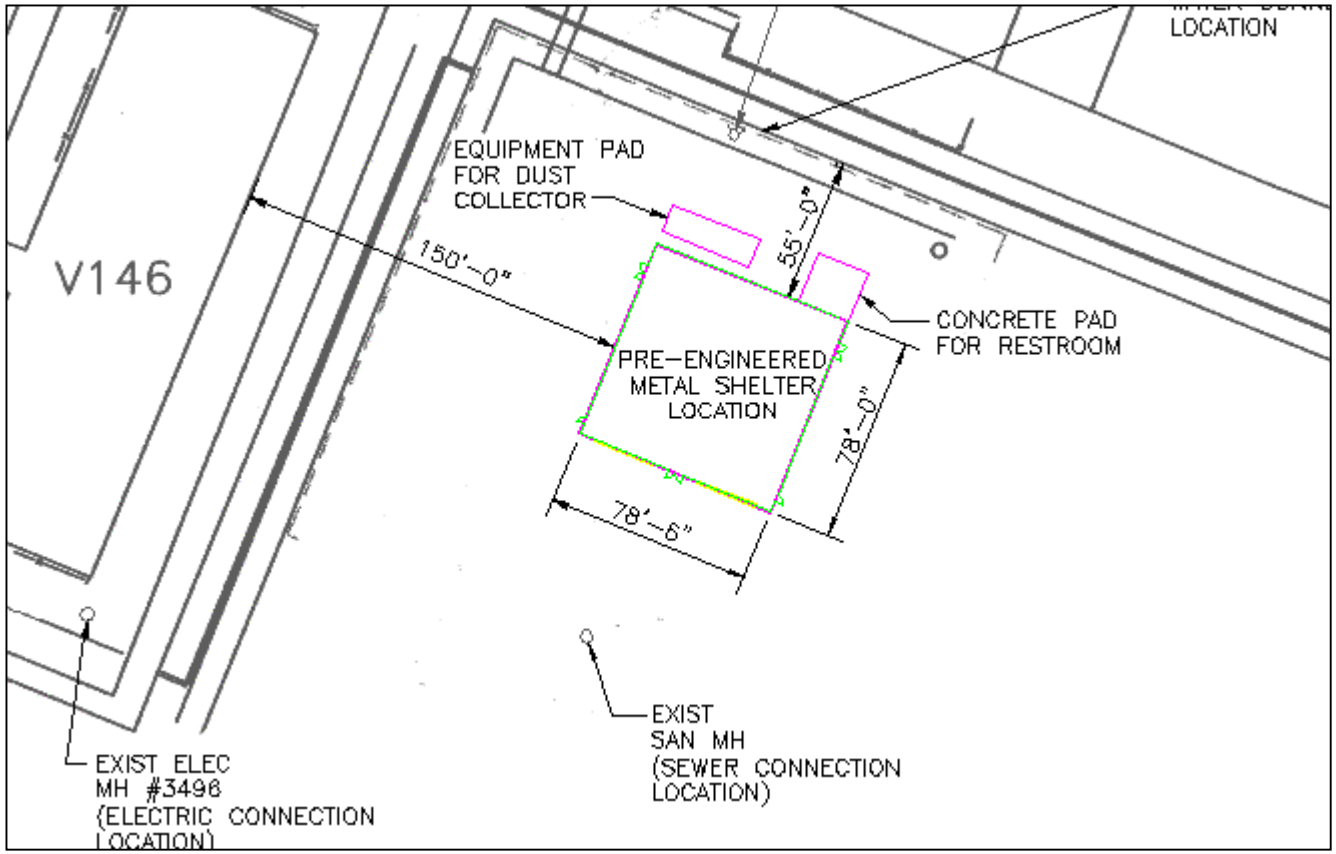
- HAZMAT Containment Pads
- High Reflectivity Floor Coatings
- High Reflectivity Wall Coatings
- Natural Ventilation
- Photovoltaic
- Solar Wall Technologies
- Wind Power
- Natural Lighting
- Work Area Lighting Control
- HVAC System Optimization
- Water Conservation
- Storm Water Treatment
- Low Flow Pressure Sprayers
- Rain Capture & Reuse Devices
- Recycling Technologies
- Recycled Concrete Base
- Use of High Fly Ash Content Concrete
- Fourier Transform Infrared Detection Devices

Approach-Install Technologies

Locating the new IMP Paint/ Depaint Facility At V-88

Proposed site for new Corrosion

Control facility



Approach-Install technologies

INSTALLING TECHNOLOGIES INTO LP-167

POWER PRESSURE WASHER

Before/After Comparison

IMP

TEST BED

AREA

IN

LP-167

BEFORE

Before/After Comparison

Example-- REFLECTIVE FLOOR COATINGS-- AFTER

IMP

TEST BED

AREA

IN

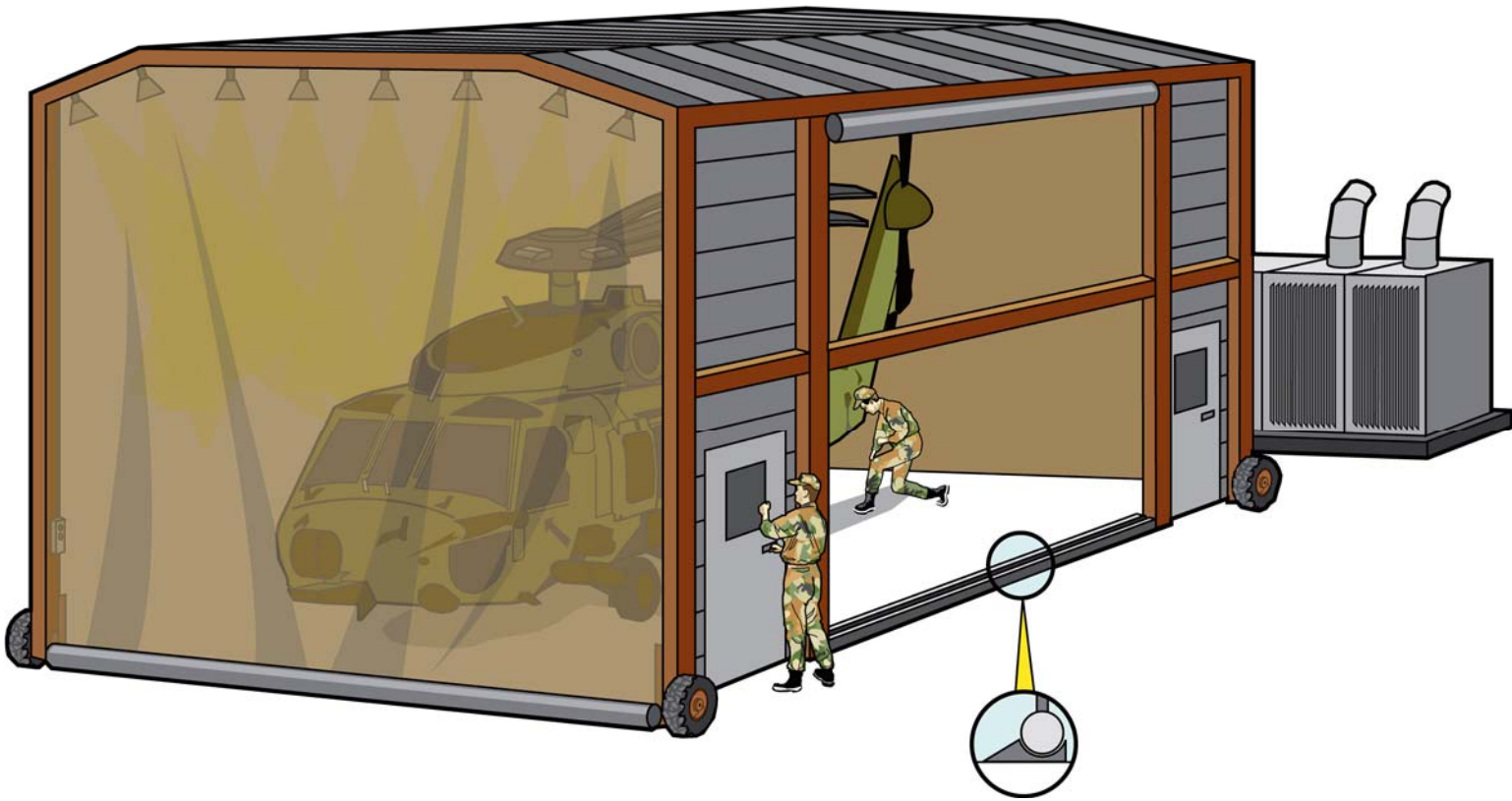
LP-167

AFTER

Approach-Install technologies

Portable Maintenance Facility

(PMF)



Technical Accomplishments to Date

IMP

TEST BED

EQUIPMENT

USE

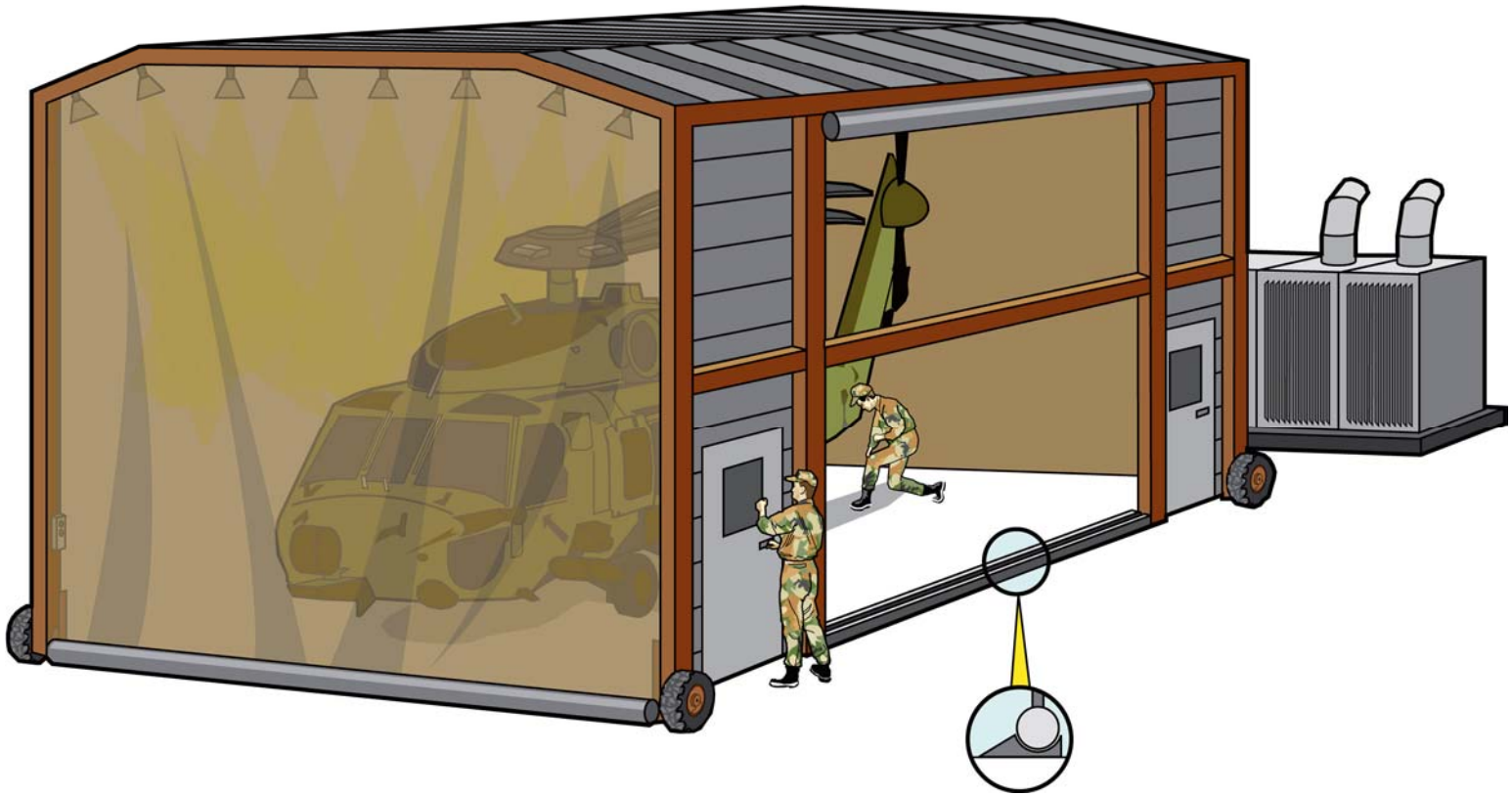
EXPLOSION

PROOF

VACUUM

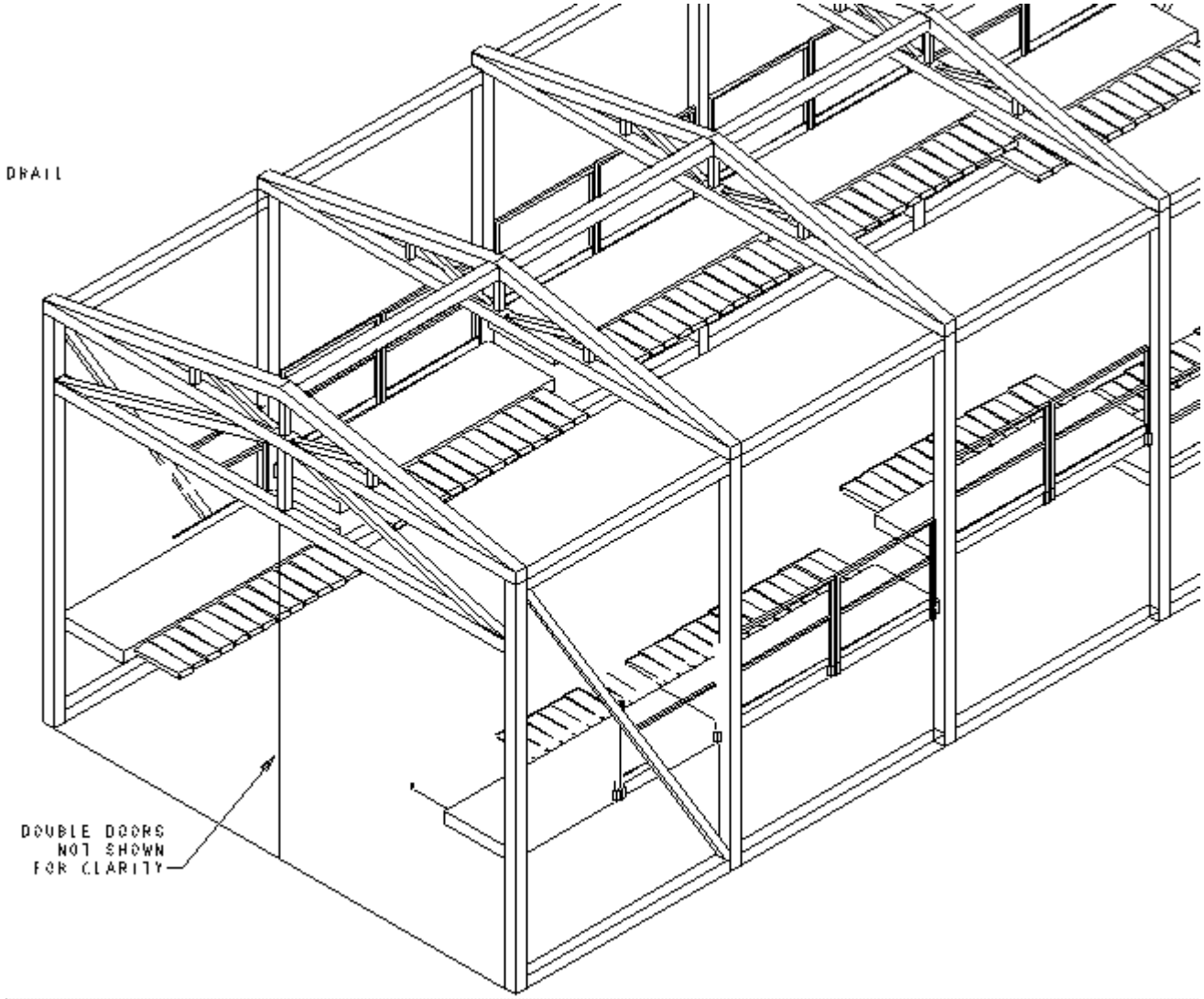
Approach-Install technologies-PMF

- Can Be Assembled and Operational within Two Weeks
- Re-locatable
- Designed for IMP Operations At Activities With Less Than 5 Aircraft Per Year.



Technical Accomplishments to Date

PMF First Generation



Technical Accomplishments to Date

PMF Ventilation System Employs Three (3) Air Walls

Flow Rate Totaling 30,000 CFM

Technical Accomplishments to Date

PMF AUXILIARY EQUIPMENT INCLUDES:

- **EXPLOSION PROOF LIGHTING**

PMB BLASTING EQUIPMENT

- **AMBIENT AIR PUMP**

Technical Accomplishments to Date

PMF AIR WALLS CONFIGURED FOR BLAST OPERATIONS

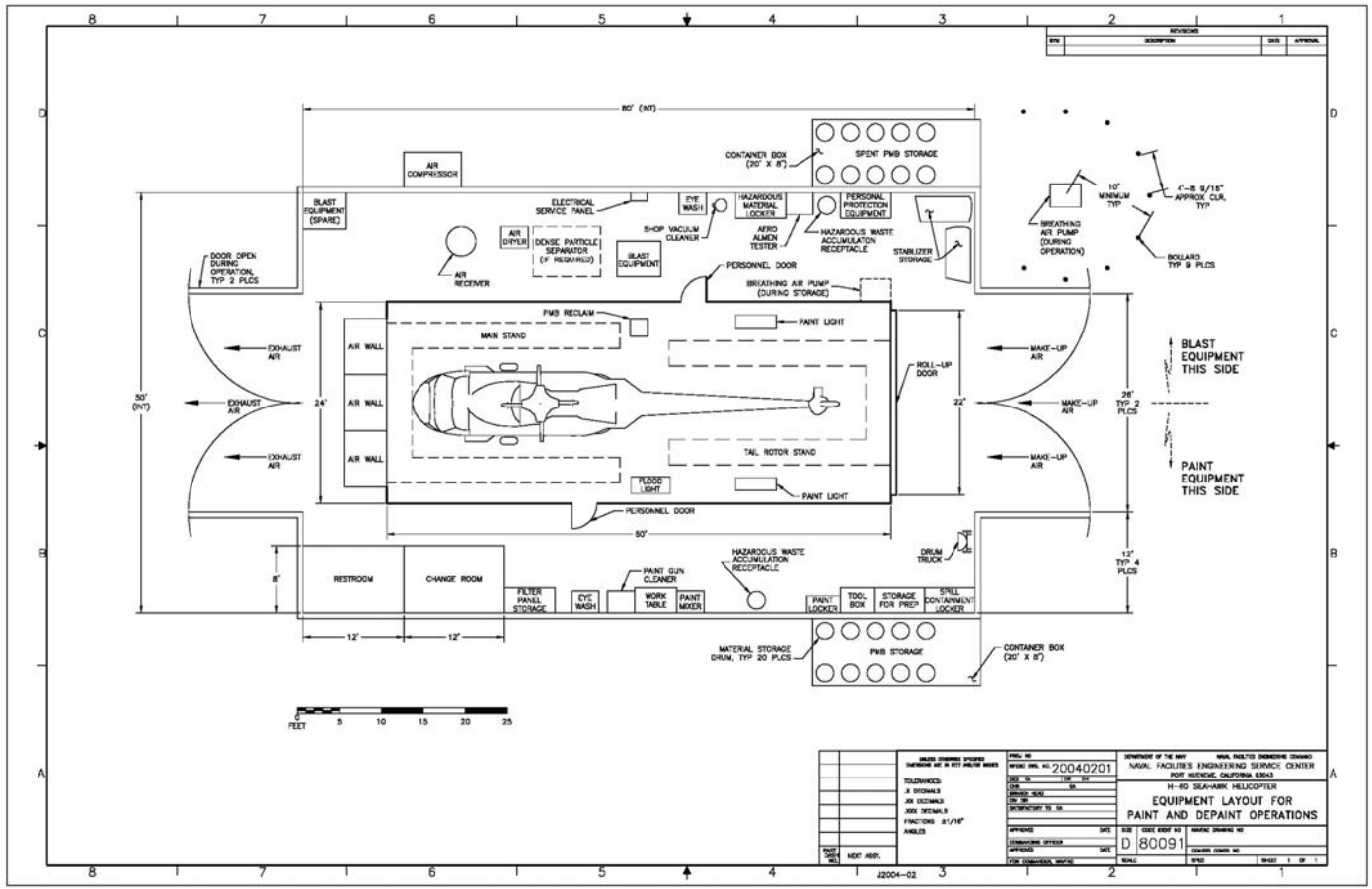
Technical Accomplishments to Date

PMF AIR WALLS CONFIGURED FOR PAINTING

H-60 WRAP AROUND SAFETY STANDS

Technical Accomplishments to Date

DESIGN FOR A PMF IN A PREENGINEERED BUILDING



Implementation Plan-Target Users/Participants

- COMNAVAIRLANT/AIRPAC (CDR McAtee/ Jim Gould)
- COMHELTACWINGPAC Maintenance Officer (Cmdr Price)
- Norfolk IMP/Nadep POCs (Cmdr Spearman/ Ron Cribbs)
- NAVAIR LMTCE WIPT (Dave Brock)
- NAVAIR 6.0 (Capt Cowards)
- NAVAIR 3.0/4.0 (LCDR Parker, Bruce Pollock/Doug Cook)
- NFESC/ PPEP (Melissa Green,D. Bojorquez & D. Price)

DEFINITION OF SUSTAINABILITY

- Normally means (LEED™, definition "Leadership in Energy & Environmental Design" Green Building Rating System, is the nationally accepted standard for green buildings developed by the USGBC membership).

  - Environmental benefits:
  - Enhance and protect ecosystems and biodiversity
  - Improve air and water quality
  - Reduce solid waste
  - Conserve natural resources
  - Economic benefits:
  - Reduce operating costs
  - Enhance asset value and profits
  - mprove employee productivity and satisfaction
  - Optimize life-cycle economic performance
  - Health and community benefits:
  - Improve air, thermal and acoustic environments
  - Enhance occupant comfort and health
  - Minimize strain on local infrastructure
  - Contribute to overall quality of life

LEEDS EVALUATION

- Current Norfolk Test Bed implements P2 products but does not encompass the vast number of improvements needed to score high in a LEEDS evaluation.
- Conceptual version of an IMP secondary site scores well
- Rating of Conceptual site scored Spirit Bronze level (25 to 34 points out of possible 100)

Close

- Support the Navy's transition from the traditional OI&D maintenance to IMP phased maintenance
- Full commitment of sponsors (Link the various commands)
- Roadmap for follow-on IMP programs
- Improved aircraft availability and aircraft material condition
- Improved ESOH compliance leading to Improved Worker Effectiveness
- $'s saved